

Claims

1. A thin film magnetic recording head for use with a magnetic recording medium comprising:

5 a yoke including a main pole piece of ferromagnetic material and a return pole piece of ferromagnetic material; and

 a floating-trailing shield of ferromagnetic material positioned on an opposite side of the main pole piece from the return pole piece, the floating-trailing shield being separated from the yoke by non-magnetic material.

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2. A thin film magnetic recording head of claim 1 wherein the floating-trailing shield has a first area on the air-bearing surface that is larger than a second area of the main pole piece on the air-bearing surface and the first area is selected to generate a first magnetic reluctance between the main pole piece and the shield
15 that is substantially greater than a second magnetic reluctance between the shield and a magnetically soft underlayer in the magnetic recording medium.

3. The thin film magnetic recording head of claim 1 wherein the main pole piece has a first area on an air-bearing surface of the head and the floating-trailing
20 shield has a second area on the air-bearing surface and the second area is substantially greater than the first area.

4. The thin film magnetic recording head of claim 1 wherein the main pole piece has a tip that extends from an air-bearing surface of the head to a flare point on
25 the main pole piece; and

 the floating-trailing shield has a thickness measured perpendicular to the air-bearing surface that is less than a length of the tip from the air-bearing surface to the flare point.

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5. The thin film magnetic recording head of claim 1 wherein the floating-trailing shield has an off-center thickness perpendicular to an air-bearing surface that is larger than a thickness at a center of the floating-trailing shield as viewed from the air-bearing surface.
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6. The thin film magnetic recording head of claim 1 further comprising a layer of electrically conductive metal separating the floating-trailing shield from the main pole piece.
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7. The thin film magnetic recording head of claim 1 wherein the floating-trailing shield extends around first and second sides of the main pole piece forming first and second side gaps.
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8. The thin film magnetic recording head of claim 7 wherein the first and second side gaps are approximately one to two times a predetermined distance from the air-bearing surface to a soft underlayer in the magnetic recording medium.
9. A thin film magnetic recording head for use with a magnetic medium with a magnetically soft underlayer comprising:
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- a main pole piece of ferromagnetic material;
 - a return pole piece of ferromagnetic material;
 - a layer of electrically conductive metal adjacent to the main pole piece on an opposite side of the main pole piece from the return pole piece; and
 - a floating-trailing shield of ferromagnetic material positioned adjacent to
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- the layer of electrically conductive metal so that the layer of electrically conductive metal separates the floating-trailing shield from the main pole piece.
10. The thin film magnetic recording head of claim 9 wherein a first magnetic reluctance between the main pole piece and the shield that is substantially
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- greater than a second magnetic reluctance between the floating-trailing shield and the magnetically soft underlayer.

11. The thin film magnetic recording head of claim 10 wherein the first magnetic reluctance is approximately ten times the second magnetic reluctance.
- 5 12. The thin film magnetic recording head of claim 9 wherein the main pole piece has a first area at an air-bearing surface of the head and the floating-trailing shield has a second area on the air-bearing surface and the second area is substantially greater than the first area.
- 10 13. The thin film magnetic recording head of claim 9 wherein the main pole piece has a tip that extends from an air-bearing surface of the head to a flare point on the main pole piece; and
the floating-trailing shield has a thickness measured perpendicularly to the air-bearing surface that is less than a length of the tip from the air-bearing
15 surface to the flare point.
14. The thin film magnetic recording head of claim 9 wherein the floating-trailing shield has an off-center thickness perpendicular to an air-bearing surface that is larger than a thickness at a center of the shield as viewed from the air-bearing
20 surface.
15. A thin film magnetic recording head for use with a magnetic medium with a magnetically soft underlayer comprising:
a yoke including a main pole piece of ferromagnetic material that extends
25 to an air-bearing surface of the head and a return pole piece of ferromagnetic material that extends to the air-bearing surface of the head;
a floating-trailing shield of ferromagnetic material separated from the yoke by non-magnetic material, extending to the air-bearing surface of the head and positioned on an opposite side of the main pole piece from the return pole piece
30 at the air-bearing surface.

16. The thin film magnetic recording head of claim 15 wherein a first magnetic reluctance between the main pole piece and the floating-trailing shield is substantially greater than a second magnetic reluctance between the floating-trailing shield and the magnetically soft underlayer.

17. The thin film magnetic recording head of claim 15 wherein the floating-trailing shield extends around the main pole piece on first and second sides to form first and second side gaps.

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18. The thin film magnetic recording head of claim 17 wherein the first and second side gaps are approximately one to two times a predetermined distance from the air-bearing surface to the magnetically soft underlayer.

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